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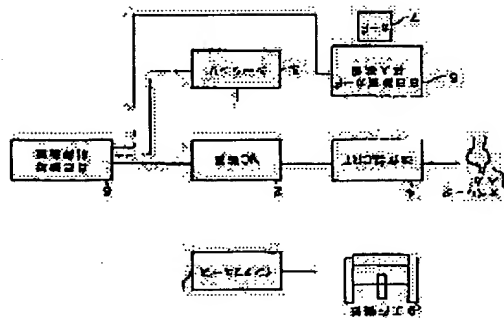
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(54) NC MACHINE TOOL WITH SELF-DIAGNOSING FUNCTION

(57)Abstract:

PURPOSE: To record the diagnostic information and to refer to this information for diagnosis of the next same fault by incorporating a self-diagnostic recording medium into a control panel containing an NC device, a display device, etc., and diagnosing the situations under the guidance of the display device.

CONSTITUTION: An NC device 2 which performs the numerical control and a sequencer 3 which performs the sequence control are connected to a machine tool 9 via an interface 1. A control panel 4 provided with a CRT, i.e., a display device is connected to the device 2, and an operator inputs the information to the panel 4. Then the panel 4 operates the tool 9 and the device 2 and also performs the display through the device 2 and the sequencer 3. In a diagnostic mode, a self-diagnostic program is independently driven by a self-diagnostic controller 6. Thus the faults are diagnosed based on the information received from the device 2, the sequencer 3 and the panel 4 together with the inference carried out based on the data recorded on a card 7.



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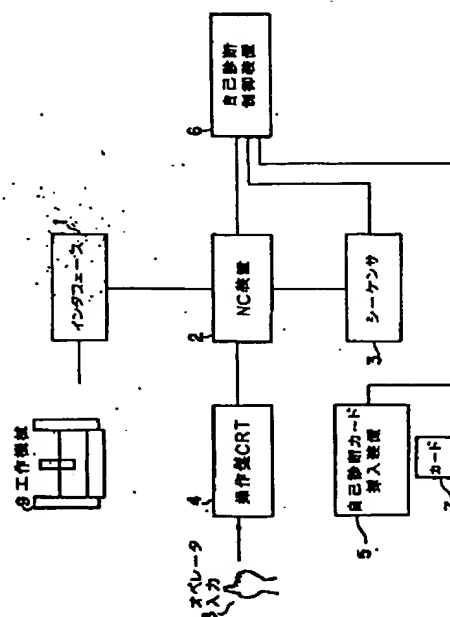
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(54)【発明の名称】 自己診断機能付NC工作機械

(57)【要約】

【目的】 NC工作機械の熟練者でなくとも自己診断を行なえるようにした。

【構成】 自己診断制御装置6にて記録媒体7のデータ、ルールにより表示装置に表示をしつつ対話形式にてNC装置2、シーケンサ3、操作盤4の情報に基づき自己診断するようにした。



【特許請求の範囲】

【請求項 1】 NC装置により制御される工作機械において、

診断ルールやデータが格納されて入出力可能な記録媒体と、

この記録媒体の記録内容や各種応答や指令を表示する表示装置と、

上記記録媒体の記録内容を対話しつつ実行しかつ表示装置に出力する自己診断制御装置と、

を有することを特徴とする自己診断機能付 NC 工作機械。 10

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、自己診断機能を有する NC 工作機械に関する。

【0002】

【従来の技術】 従来、NC 工作機械の自己診断は、機械が停止した時に工作機械や NC 装置に精通した熟練した人が調査し、その人の能力により行なっていた。

【0003】 しかしながら、従来ではかかる診断は熟練者しかできず、また電源を切ったりして状態の変化があった場合には原因究明ができにくいという問題がある。すなわち、機械が不具合等により故障した時、いかなる状態で停止したか調査しいかなる原因で生じたかを調べるには、その機械の熟練者でないと全く手がかりがつかめないことが多く、また、過去の不具合の原因究明や修正の手順は調査した人しか記憶していないことも多く、再度同じ故障が生じた時にはその人を捜さなければならない。また、不具合の時点での状況が変化した場合に 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480 490 500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650 660 670 680 690 700 710 720 730 740 750 760 770 780 790 800 810 820 830 840 850 860 870 880 890 900 910 920 930 940 950 960 970 980 990 1000 1010 1020 1030 1040 1050 1060 1070 1080 1090 1100 1110 1120 1130 1140 1150 1160 1170 1180 1190 1200 1210 1220 1230 1240 1250 1260 1270 1280 1290 1300 1310 1320 1330 1340 1350 1360 1370 1380 1390 1400 1410 1420 1430 1440 1450 1460 1470 1480 1490 1500 1510 1520 1530 1540 1550 1560 1570 1580 1590 1600 1610 1620 1630 1640 1650 1660 1670 1680 1690 1700 1710 1720 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【符号の説明】

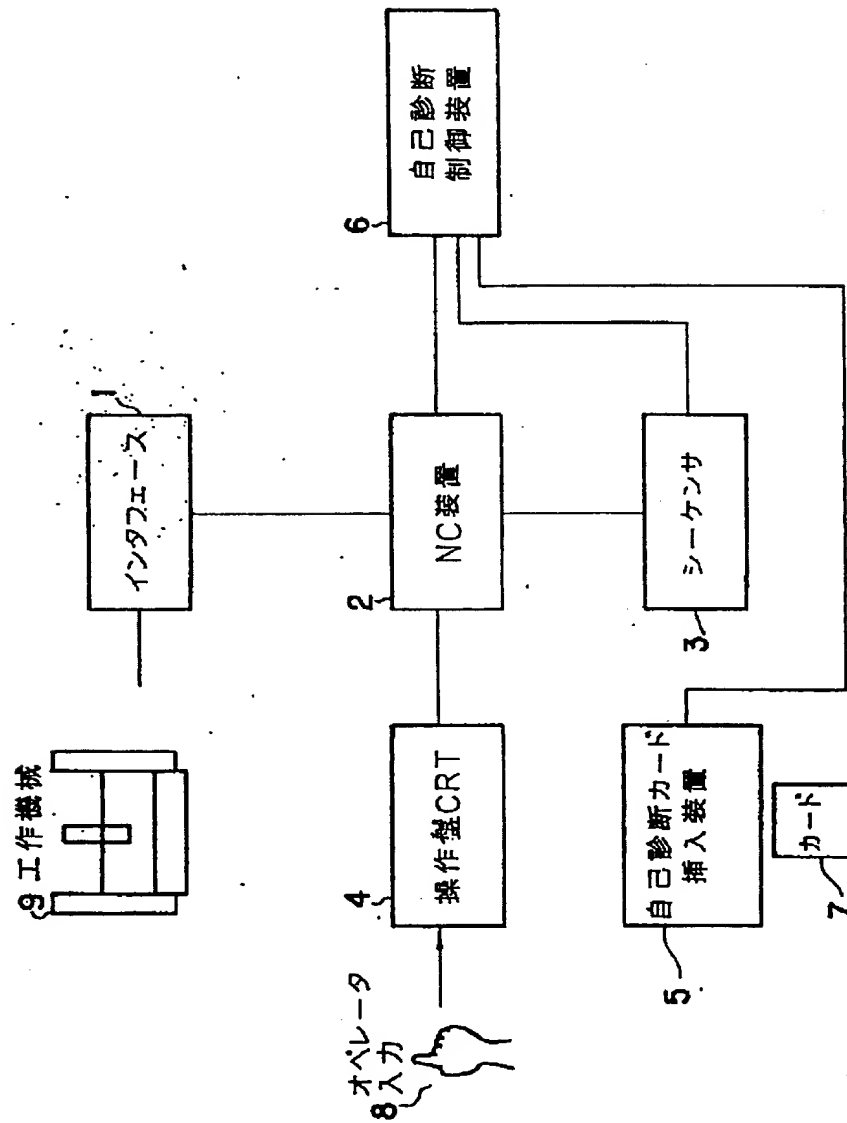
4 CRTを含む操作盤

5 自己診断カード挿入装置

6 自己診断制御装置

7 カード

【図1】



[What is claimed is:]

[Claim 1]

An NC machine tool with a self-diagnosing function, which is a machine tool controlled by an NC device, characterized by comprising:

a recording medium in which a diagnostic rule and data is stored and to/from which data can be inputted/outputted;

a display for displaying data recorded on the recording medium, and various responses and instructions; and

a self-diagnostic controller for executing the data recorded on said recording medium and outputting the data to the display while performing interaction.

[Detailed Description of the Invention]

[0001]

[Industrial Field of Utilization]

The present invention relates to an NC machine tool having a self diagnosing function.

[0002]

[Related Art]

Conventionally, self diagnosis of an NC machine tool is carried out by a skilled person conversant in the machine tool and an NC device after performing investigation by his ability when the tool stops.

[0003]

However, such diagnosis can be conventionally carried out only by a skilled person and has a problem that when the state has changed due to turn-off of the power source or the like, the cause cannot be easily

found. Specifically, when the tool fails due to a trouble or the like, in order to investigate the state in which the machine has stopped and to know the cause of the failure, in many cases, only a skilled person conversant in the tool can find clues. In many cases, only the person who has investigated the cause of a past failure remembers the procedure of finding the cause and fixing the failure. When the same failure occurs again, the user has to find the person who had fixed it. When the state upon occurrence of the failure changes, there is a case such that clues of the failure cannot be found.

[0004]

In consideration of the problems, it is an object of the invention to provide an NC machine tool with a self-diagnosing function capable of easily diagnosing the cause by not necessarily a skilled person.

[0005]

[Means for Solving the Problems]

According to the invention for achieving the object, there is provided a machine tool controlled by an NC device, characterized by comprising: a recording medium in which a diagnostic rule and data is stored and to/from which data can be inputted/outputted; a display for displaying data recorded on the recording medium, and various responses and instructions; and a self-diagnostic controller for executing the data recorded on the recording medium and outputting the data to the display while performing interaction.

[0006]

[Operation]

When a machine fails and stops, by inserting a recording medium for self diagnosis into an NC device or a control panel having a display, a self-diagnosing program is executed. The details of the failure and data for investigating the cause are displayed on the display, and the state is diagnosed while being guided by the display. Diagnostic information can be provided as an answer on the display. When a series of works are completed, the cause is found, and the machine is recovered, by instructing completion of the work, information of the series of works is recorded on the recording medium for self diagnosis. When the same failure occurs again, the information can be therefore displayed and used for reference.

[0007]

[Embodiment]

An embodiment of the invention will be described with reference to Fig. 1. In Fig. 1, an NC device 2 for performing a numerical control and a sequencer 3 for performing a sequence control are connected to a machine tool 9 via an interface 1 in order to operate the machine tool 9. A control panel 4 having a CRT as a display is connected to the NC device 2. The control panel 4 receives an input 8 of the operator. In the control panel 4 including the CRT, the tool machine 9 and the NC device 2 are operated and information from the NC device 2 and the sequencer 3 is displayed.

[0008]

On the other hand, the NC device 2 and the sequencer 3 are connected to a self-diagnostic controller 6. A self-diagnostic card

insertion device 5 is also connected to the self-diagnostic controller 6 and information is transmitted/received between the self-diagnostic controller 6 and a card 7. On the card 7, diagnostic inquiry display data, an inference rule used for diagnosis, and past diagnostic data to be displayed on the CRT is written and recorded.

[0009]

Diagnosis is carried out by independently driving a self-diagnostic program by the self-diagnostic controller 6 on the basis of information of the NC device 2, sequencer 3, and control panel 4. Specifically, the diagnostic inquiry display data recorded on the card 7 is sequentially displayed on the CRT, and the diagnosis is carried out on the basis of responses of the operator to the display and internal information of the NC device 2 and the sequencer 3 in accordance with the diagnostic rule recorded on the card 7. In this case, past diagnostic data recorded on the card 7 is also displayed. In such a manner, the self-diagnostic controller 6 makes an inference on the basis of the data recorded on the card 7, and the cause of the failure is determined. After the diagnosis, the result of the failure is recorded on the card as a reference in the case where a failure occurs again.

[0010]

Although a card has been used as the recording medium in the above description, a floppy disk, a cassette tape, or the like can be also used as a recording medium. Except for the CRT, an LED and the like can be also applied as a display device.

[0011]

[Effects of the Invention]

According to the invention as described above, an inconvenience as in the conventional technique such that a failure can be fixed only by a skilled person and is processed after it occurs again due to stop of the machine for long time or an unknown cause is eliminated. The state where the machine tool stops and the method of tracking down the cause are specifically displayed and easy to be understood by anyone. By incorporating information obtained through an interactive operation with the operator, important data is stored. Since the card is used, the card can be applied to a similar machine. Such great effects are produced.

[Brief Description of the Drawing]

[Fig. 1] Block diagram of an embodiment of the invention.

[Description of Reference Numerals]

- 4 control panel including CRT
- 5 self-diagnostic card insertion device
- 6 self-diagnostic controller
- 7 card

Fig. 1

- 9 MACHINE TOOL
- 1 INTERFACE
- 8 OPERATOR'S INPUT
- 4 CONTROL PANEL WITH CRT
- 2 NC DEVICE
- 6 SELF-DIAGNOSTIC CONTROLLER
- 5 SELF-DIAGNOSTIC CARD INSERTION DEVICE
- 3 SEQUENCER
- 7 CARD